AMSAT SATELLITE REPORT

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Geo-Synch Launch Slots Hopeful

AMSAT Officials in Washington and Marburg last week were discussing options afforded by two major launch opportunities as possible follow-ons to Phase IIIB. Phase IIIB, the first in the series of high-altitude, long-lived Amateur Radio satelites is due for launch this July.

The first new launch opportunity being discussed is a U.S. launch in a test vehicle scheduled for late 1983 or early 84. AMSAT's payload would supplant a mass simulator that the U.S. government would otherwise have to contract (and pay) for. AMSAT would manufacture its modules to simulate the mass characteristics of a government payload to be flown later. The AMSAT payload could amount to 500 kg or more (more than 1200 lbs; half a ton!) and include many a device fancied by today's most ardent dreamer. The platform would be spin-stabilized and virtually large enough for a cluster of elaborate antennas. Power and stability come free to the passengers (us). The spacecraft is a test vehicle for the DSCS II (Defense Satellite Communications System). As a test launch, it is presumed to be slightly more risky than one that has been well-tested such as a Delta launch. Delta has been launched literally hundreds of times. In return for accepting the risk a prospective passenger gets a million dollar opportunity to a geo-synchronous orbit. As discussed recently, a so-called geo-synchronous drifter may offer the near-term solution to the problem of serving a world amateur population from a geo-synchronous satellite which by definition can see only slightly less than one third of the earth's surface at any given instant. The drifter would be placed directly over the equator just as the true synchronous birds are. However, the drifter would be at a slightly different altitude so that its sub-satellite point moved over the equator. If stationed a bit higher than the true geo-synchronous birds, the drifter would appear to travel slowly from east to west. Conversely, if the drifter were lowered a bit it would appear to move from west to east. By adjusting the altitude one could determine in advance the rate of change of coverage zones. One rate suggested by AMSAT President W3IWI was a rate that would have the sub-satellite point (SSP) circumnavigate the earth at the equator once per month. This would provide the user 10 days of continuous coverage followed by 20 days of non-coverage. The non-use time would always be twice that of the use time since the illuminated area can be no more than one third of the earth's surface. In other words, you can determine how long you would like the continuous coverage period to be but the "out-of-sight" period will always be twice as great. That's what a synchronous drifter is all about.

What could we get on this bird if we do get a berth?

Well a half ton is a big, big berth to fill and some folks are itching to get some exotic new boxes up there. Big antennas to reduce ground station requirements, packet radio repeaters, broad-band transponders, you name it!

Meanwhile on the European front, Dr. Karl Meinzer, DJ4ZC, AMSAT DL President at Marburg is pursuing an interesting lead on the next generation Ariane from the European Space Agency. The new, bigger, more powerful Ariane is called Ariane 4. ESA has announced a launch opportunity for experimenters (such as AMSAT) in the 1985 time frame. This would be for a geosynchronous launch from the ESA facility at Kourou and allow a payload of up to 2000 kg (4400 lbs) on the upper section of the payload package and 1000 kg (2200 lbs) on the lower portion. Using the upper section AMSAT could place in geosynchronous orbit one each Porsche and BMW! If motor cars in orbit seem less than maximally useful, imagine what manner of amateur radio/scientific payload might be substituted for these famous German automobiles! The prospects of this Ariane 4 launch will certainly bring many in the amateur space consortium into the arena. France's burgeoning Arsenne group will certainly play a leading role in filling the payload bay on Ariane 4.

With these two very substantial launch opportunities as potential rides for Phase IIIC and the first of the true Phase IV birds, the future looks very bright indeed for the hams in space theme. As the Spring Board of Directors meeting approaches, the Directors will be asked to consider AMSAT's traditional role in amateur radio and if it may be time to consider aligning ourselves with a broader community of amateurs in space. Not "radio" amateurs but folks like the World Space Foundation (Solar Sail), the Independent Space Research Group (Amateur Space Telescope) and others. AMSAT has a unique position among such groups having been in space for more than a decade. Should AMSAT assume a leadership role in the broader context of amateurs in space? And if we don't move forward with inspired, constructive use of launch opportunities will somebody else displace

us? Is the end of the road for Amateur Radio satellites the dry gulch of evaporated launch opportunities? Does it come down to lead or be led (at your own peril)? These difficult questions will be addressed by your elected representatives, the AMSAT Board of Directors this April 3-4. Bid them God-speed and wisdom, won't you?

Russian Satellite Polar DX Soon

The expected expedition to the polar regions of Siberia was under way as the party left Moscow on 8 Mar. 82 according to G3IOR who quoted LZ1AB. The latter is thought to have good connections with the Radio Sport Federation of the USSR and UA3CR in particular. Leonid Labutin, UA3CR, the guiding force behind the Russian amateur radio satellites, is known to be accompanying the group as communications manager.

By 14 Mar. they had reached the town of Tiksi at the Lana River located 71° 45′ North by 129° 30′ East, according to G3IOR.

G3IOR believes that UA3CR will be staying at Tiksi and operate stations under the callsigns EKØCR, EKØDTD and EKØAOC from there. It was believed that the main expedition group would set out on 15 or 16 Mar. for a 600 km journey presumably northward.

Two stations were built for the expedition by UA3CR. One is a small HF rig for working 80, 40 and 20 meters. The second is a miniature OSCAR station that weighs only 400 grams (about a pound) and will be used to send messages through RS-6, RS-8 and OSCAR 8. The antenna for the satellite work is a simple 3 element yagi which uses a ski pole for the boom and two other ski poles for the mast. The 2 meter xmtr is said to have a memory of 50 words which can be sent to the satellites. These "radiograms" will form the basis of a competition sponsored by the Radio Sport Federation. The trick will be to copy the most radiograms sent by satellite by UA3CR. The competitor need not copy the entire message but merely the QTC set comprising 2 figures, one constant letter "R", followed by two additional figures. For example, the QTC set "Ø2R12" could be copied for points ("R" is constant but the numbers will vary).

The operating frequencies will be (RS-6) 29.443 and (RS-8) 29.495. Frequency of operation on OSCAR 8 was not divulged. In addition, the HF frequency of 14.182 MHz will be operated at 1330 UTC.

K8OCL Demonstrates Six-dB $ Amplifier

John J. Champa, K8OCL, AMSAT's Northeastern Ohio Area Coordinator, recently demonstrated an effective money amplifier for AMSAT's benefit. Here's how it worked.

John donated $100 to the 20th Anniversary Amateur Satellite Fund Drive through his employer's matching fund plan. John's employer (Cooper Industries of Houston, TX) then took John's donation and matched it with another $100. Thus the Satellite Fund Drive, administered by the ARRL Foundation, received a check from Cooper Industries for $200. The ARRL Foundation matching funds then matched that $200 to yield $400 for the benefit of the Amateur Space Program. So John's original $100 has been converted to a $400 input to build satellites. In the financial world John's actions would be viewed as an astute use of leverage. That is, he was able to leverage a large block of dollars with a relatively small investment. In the electronics domain they call that "gain." The gain of John's dollar amplifier is easily seen as 6 dB according to the equation: gain in dB = 10 log O/I where O is the output and I is the input. (We use the power rule instead of the voltage gain, i.e., 20 log O/I, since everyone knows money is power!) Which ever way you look at it, though, John's input is appreciated. The output is appreciated about 6 dB $ more! John suggests that others look to their employers to learn if they have an analagous matching fund program. It may prove to be an important source of revenues for AMSAT in the future.

April Board Meeting Slated

The Spring meeting of AMSAT's Board of Directors will be held in New York the weekend of 3-4 April it was announced recently. Chairman W6SP indicated that in keeping with the Bylaws and pressing issues before the Board, the meeting should be held in early Spring. Directors W3IWI, W3GEY and K1HTV will be heavily involved in the final preparations for the launch of Phase IIIB. The pace of activities is accelerating. The concensus was that if the meeting were not held in very early April it would have to be postponed until after July. The New York venue was elected based on minimum transportation complications for the two Directors travelling the furthest: JA1ANG from Toykyo and G3IOR from Norwich.

Arrangements for the meeting at the Stirling Forest campus of New York Unviersity were made by Dr. Steve Robinson, W2FPY, who is a research scientist at the facility. The campus is located in the suburban hills 25 miles northwest of New York City. Both JA1ANG and G3IOR will have easy access to the meeting site by flying directly to New York's JFK International Airport.

AMSAT holds two Directors' meetings annually. The Autumn meeting is held in conjunction with the Annual General Meeting. This is scheduled for September or October at the Goddard Space Flight Center in Greenbelt, Maryland.

At presstime the planned agenda for the April 82 meeting was incomplete though Chairman W6SP was thought to have a draft agenda in hand. Members with important issues suitable for Board consideration are invited to communicate them to any Director. The Board now comprises W6SP, W3IWI, K1HTV, VE2VQ, JA1ANG, G3IOR and W3GEY.

Balloon Launch From ZS

A balloon launch of a Mode-J type transponder is scheduled for 10 April according to ZS6AKV. Details were sketchy at presstime with the only other news being that the launch site would be Johannesburg, S.A.

Phase III Countdown: The Airane Launcher

In this second of the Phase III Countdown series in *ASR* we will begin our detailed look at the various systems that will make the entire project work. Appropriately we begin our detailed view with the baseline for everything; the launch vehicle which will carry Phase IIIB to its lofty perch from which vantage the wonders fashioned by technicians around the world will become real.

In many ways Ariane is rather conventional as launch vehicles go. In fact the 11-nation consortium that comprises ESA, the European Space Agency, is counting on that conventionality to payoff. They believe that the lower risk, "standard" approach is to be preferred over any attempt at radical new technology as alluring as may be the potential benefits. For example, the Viking engines that power its first two stages are derivatives of the well-tested French Diamant rocket of the mid-sixties. That spells low risk. Now seeing the first three of four Arianes as successes, the path ahead for the operational launches appears bright indeed. In fact, the failure rate of other major programs was, at times, much more dismal than is Ariane's now.

The main mission of Ariane is to carry about 1700 kg (3750 lbs) to a geo-synchronous transfer ellipse of 200 km x 36000 km and 7° inclination from the launch site at Kourou, French Guiana. To do this, Ariane uses a three-stage liquid fueled rocket.

Ariane's first stage engines are called the Viking 5. Clustered in the "four pack" they are called the L140 stage. The L140 is rated at 2445 kN thrust at lift off and at 2745 kN in a vacuum. The specific impulse of the stage is 281.3 seconds. The fuel for the engines is UDMH or unsymmetrical di-methyl hydrazine. This liquid is combined with the oxidizer, nitrogen tetroxide in the combustion chamber at considerable pressure to produce the thrust. The two components do not require an ignition source as they explode on combination. The first stage engines burn for 145 seconds. For steering, each of the Viking 5 engines can be gimballed in pairs about two orthogonal axes to provide three-axis control.

The second stage consists of a single Viking 4 engine called a L33 stage. It uses the same fuel as the first stage. The L33 develops a thrust of 709 kN in a vacuum with a specific impulse of 293.5 seconds. The second stage burns for 132 seconds.

The third stage of Ariane is the first cryogenic stage developed in Europe. It caused considerable headaches and worry since it WAS a development item unlike most of the other hardware. It had a strong tendency to explode in ground tests. However the devils in the design seem to have been exorcised and the flight tests of the third stage have been good. What makes the third stage so tricky is the use of the combination of liquid oxygen (LOX) and liquid hydrogen. The HM-7 engine produces a thrust of 60 kN and has a specific impulse of 440 seconds.

The engines for all three stages are built by Aerospatiale/SEP with Air Liquide and MBB participants in the HM-7 cryogenic engine of the H8 third stage.

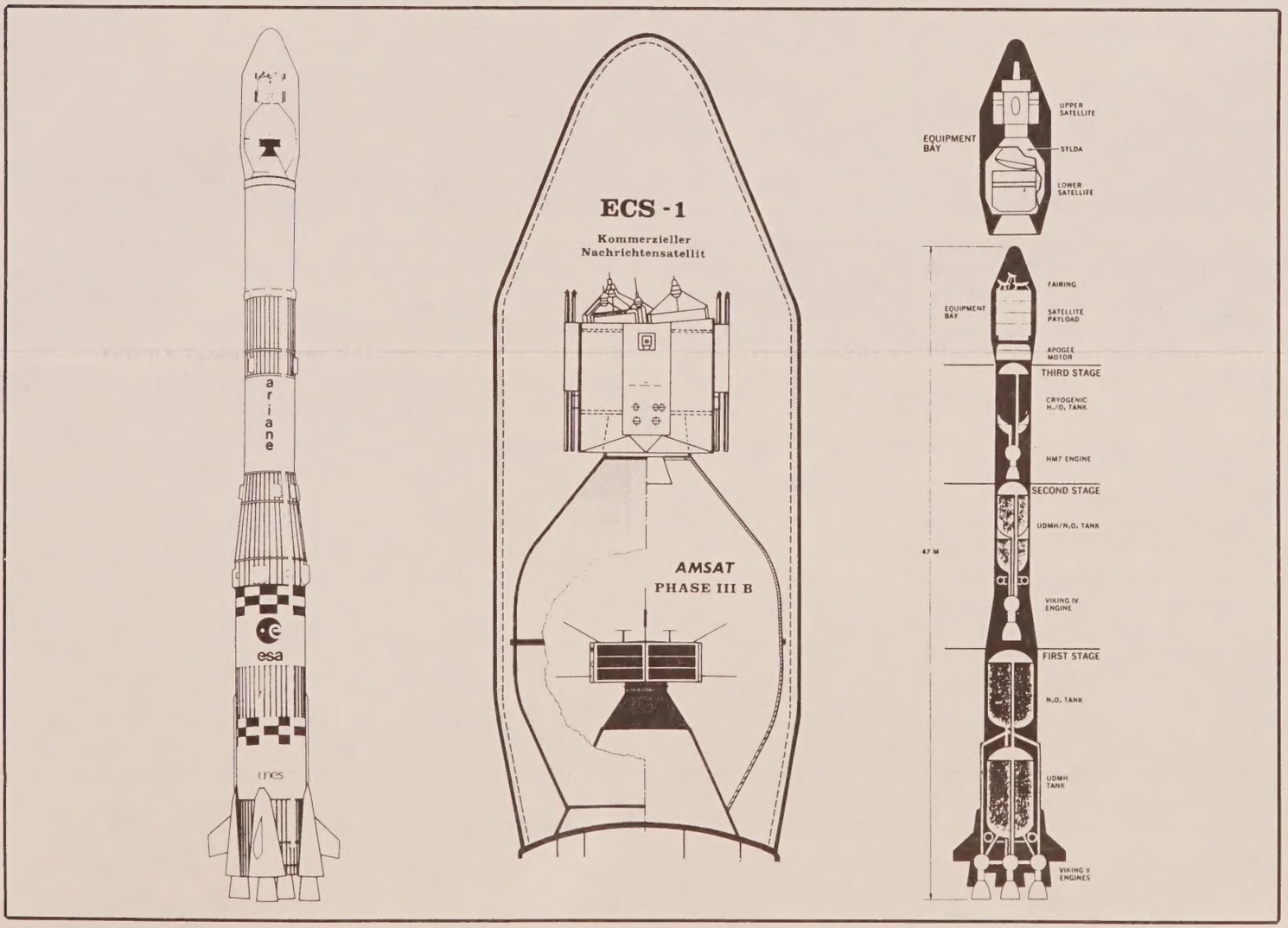
In all the Ariane stands 47.4 meters (155.5 feet) tall and weighs 207 metric tonnes (455,400 lbs). At liftoff 90% of the weight is propellant (fuel and oxidizer). The structures account for 9% and the payload a mere 1% of take off weight. The third stage diameter is 3.78 meters (12.4 feet) and the diameter of the second and third stage is 2.6 meters (8.5 feet).

The payload sits atop the entire arrangement covered by a fairing which protects the payload during the ascent. The interior of the fairing is a roomy 3 meters in diameter by 5.3 meters high (9.8 x 17.4 feet) which is large enough for the largest satellites or two medium sized satellites to be accommodated. Phase IIIB will be carried aloft with another satellite in the Ariane double launch system called SYLDA. The fairing consists of two half shells that are jettisoned during the second stage burn when the launcher has reached about the 110 km altitude.

The launch site at Kourou is especially noteworthy because of its proximity to the equator. The site's latitude of 5.23°N allows it an advantage of using the added velocity of the earth's surface at the equator to add to the launch velocity of the Ariane. It's rather like an aircraft carrier turning into the wind to launch its aircraft, though this is a superficial analogy to be sure. In any case the low latitude affords Ariane a 17% throw weight advantage over Cape Canaveral.

Ariane seems to be a launcher with a growing following. Since the successful completion of the fourth and final test launch, LO4, last year, three major U.S. passengers have signed on for launches of their communications satellites. AMSAT's launch on L6 is presently scheduled for July 82 after the May launch of L5. Let's all hope for a good ride!

Next time we'll look at another of the major systems that will make Phase IIIB the most exciting thing to happen in amateur radio.



Events to Signify Space-Awareness

AMSAT Headquarters recently received the following two news releases. They are reprinted here for *ASR* readers to serve their broader interests. *ASR* will be pleased to receive reader's reports of participation.

May 1 Designated as Astronomy Day for 1982

A coalition of North American amateur and professional astronomy groups has designated Saturday, May 1st as Astronomy Day for 1982.

Celebrated nationally since the mid-1970's, Astronomy Day gives an opportunity for those who watch the skies regularly to share their fascination with friends, neighbors, and the public. Hundreds of amateur astronomy groups, observatories, planetariums, and colleges are expected to set up special observing sessions on or around May 1.

During past astronomy day celebrations, telescopes have been set up in shopping centers, schools, parks, and even on a few street corners. Thousands of people who have never looked through a telescope were able to view the planets, nebulae, and galaxies and to discuss new developments in the field with astronomers and astronomy enthusiasts.

Astronomy Day is organized by the two main amateur astronomy organizations in the U.S., the Astronomical League and the Western Amateur Astronomers, as well as the three main professional organizations, the American Astronomical Society, the Astronomical Society of the Pacific, and the International Planetarium Society. In Canada programs are organized by the various Centres of the Royal Astronomical Society of Canada.

Activities and specific times in each city or region will vary depending on local facilities and weather conditions. (Some cities or states celebrate an Astronomy Week which begins or ends on the national Astronomy Day.) The media in each area will generaly publicize the programs which are scheduled.

The Astronomical Society of the Pacific will be coordinating the media publicity for the event. Any group or institution planning an Astronomy Day program is asked to send information about local plans to the Society by April 1. They in turn will compile this information on a regional basis and act as a clearinghouse for the media.

Please send details about the nature, location, and time of your programs, together with the name, address, and phone number of a contact person, to:

Astronomy Day Listings
A.S.P.
1290 24th Avenue
San Francisco, CA 94122

Spaceweek Seeks Participants, Plans Petition

Space promoters are mounting a vigorous campaign to bring space exploration into the hearts and minds of Americans this summer. They've chosen the Apollo 11 anniversary week, July 16-24, to conduct an annual event called "Spaceweek."

Spaceweek's national headquarters in Houston is training and coordinating prospace groups in some thirty cities. During Spaceweek, these groups will host public space lectures and exhibits and possibly conduct the first nationwide petition to help support the space program.

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Arg. of Perigee	171.8222	131.6275
Mean Anomaly	188.3032	228.5560
Mean Motion	13.96421171	15.13872910
Rev. # of Ref. Epoch	20381	2301

As part of its training role, Spaceweek National Headquarters has recently revised *The Spaceweek Handbook*. This book is part of a kit mailed to space supporters throughout America, showing how to hold educational space events, raise funds and gain publicity for Spaceweek.

Last summer, all 50 states plus Puerto Rico signed Spaceweek or Space Day proclamations. The most significant part of this year's Spaceweek may be two special petitions available to be signed by attendees at all Spaceweek events. People will be able to walk away from space events and lectures with a feeling that they have done something to help the space program.

The two petitions being planned–one for voting aged adults and one for future voters–are designed to show that public support for space is both deep and lasting. Aimed at some specific goal for Congress or the Administration to endorse, a copy will be presented locally to a space-supporting senator or congressman. Tentative plans call for the originals to be flown to Washington, D.C. for presentation before news cameras to a senior government official, on the capitol steps.

"1982 will see great NASA budget battles, elections, and the announcement of our first major U.S. space policy in over a decade," said Spaceweek President Dennis Stone. "Spaceweek '82 can thus be highly influencial in showing our nation's leaders the depth of popular support for space, even in times of budgetary uncertainties."

Spaceweek seeks scientists, engineers, futurists, and amateurs with an interest in space, to hold events. "July 20, 1969 will stand out as the most important day of the century," Stone predicted. "Spaceweek is a time each year to commemorate our past accomplishments in space and commit our nation to further steps toward our next frontier," he said.

Persons wishing to help organize Spaceweek '82 in their local areas are urged to write now for their copy of the *Handbook*, available for a $10 donation. Spaceweek's address is:

Spaceweek National Headquarters
P.O. Box 58172
Houston, TX 77258

	RS-3	RS-4	RS-5	RS-6	RS-7	RS-8
Element Set #	20	23	22	15	25	49
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RAAN	241.5657	241.2405	239.2224	242.3797	242.6279	234.5445
Eccentricity	0.0058387	0.0018304	0.0009544	0.0050429	0.0021744	0.0019627
Arg. of Perigee	317.4420	7.4468	31.1474	331.5161	308.2325	49.4457
Mean Anomaly	42.2156	352.6855	329.0136	28.3147	51.6779	310.8305
Mean Motion	12.15573263	12.06648266	12.05024910	12.13538468	12.08662999	12.02918494
Rev. # of Ref. Epoch	824	840	886	808	983	991

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